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| 10/027,784      | 12/19/2001  | Paul V. Long         | 20030/87:1          | 9581             |

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| EXAMINER |
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| ART UNIT | PAPER NUMBER |
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2851

DATE MAILED: 11/06/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/027,784

Applicant(s)

LONG ET AL.

Examiner

Michelle Nguyen

Art Unit

2851

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4. 6) ☐ Other: .

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1, 2, 6, 13, 18 and 21 are rejected under 35 U.S.C. 102(a) as being anticipated by U.S. Patent No. 6,262,851 to Marshall.

With regard to claim 1, Marshall shows a well-known image projection system, comprising:

a projection lens (projection lens 460) (Fig. 4);

a dichroic cross-combiner assembly (dichroic prism 450) having sides with one side facing the projection lens 460 (see Fig. 4);

three reflective imaging devices (SLMs 435, 440, 445), each SLM positioned facing a side of the dichroic prism 450 (see Fig. 4); and

a light source apparatus generating narrow bands of blue, green, and red light and positioned such that the three SLMs 435, 440, 445 respectively receive the blue, green and red light and reflect the blue, green and red light through the dichroic prism 450 toward the projection lens 460 (see Col. 3, lines 22-5, Fig. 4).

With regard to claim 2, Marshall shows the light source apparatus of the well-known projection system as discussed above with respect to claim 1 to comprise three

colored light sources (light sources 405, 410, 415) that respectively provide the narrow bands of blue, green and red light (see Fig. 4).

With further regard to claim 1, Marshall discloses an image projection system (projection system 700), comprising:

a projection lens (projection lens 690) (Fig. 7);

a dichroic cross-combiner assembly (color separation/recombination device 615) having sides with one side facing the projection lens 690 (see Fig. 7);

three reflective imaging devices (SLMs 735, 740, 745), each SLM positioned facing a side of the color separation/recombination device 615 (see Fig. 7);  
and

a light source apparatus generating narrow bands of blue, green, and red light and positioned such that the three SLMs 740, 735, 745 respectively receive the blue, green and red light and reflect the blue, green and red light through the color separation/recombination device 615 toward the projection lens 690 (see Col. 5, lines 27-30, Col. 7, lines 29-37, 55-64, Fig. 7).

With regard to claim 6, Marshall teaches the light source apparatus of the projection system 700 as discussed above with respect to claim 1 to comprise a multicolor light source (light source 605) that generates the narrow bands of blue, green and red light (see Fig. 7).

With regard to claim 13, Marshall teaches the SLMs 735, 740, 745 as discussed above with respect to claim 1 to include reflective pixels adapted to selectively reflect the blue, green and red light towards the projection lens 690 (see Col. 8, lines 7-11, Fig. 7).

With regard to claim 18, Marshall shows the dichroic prism 450 of the well-known projection system as discussed above with respect to claim 1 to be adapted to simultaneously receive the blue, green and red light from the respective SLMs 435, 440, 445 and to combine the blue, green and red light to form a composite image directed toward the projection lens 460 (see Fig. 4).

With further regard to claim 18, Marshall teaches the color separation/recombination device 615 of the projection system 700 as discussed above with respect to claim 1 to be adapted to simultaneously receive the blue, green and red light from the respective SLMs 740, 735, 745 and to combine the blue, green and red light to form a composite image directed toward the projection lens 690 (see Fig. 7).

With regard to method claim 21, the structure of each of the image projection systems as discussed above with respect to claims 1 and 18 renders the steps set forth in the method claim inherent to the operation of each of the image projection systems.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3, 7 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall as applied to claims 2 and 6 above, respectively, and further in view of U.S. Patent No. 5,159,485 to Nelson.

With regard to claim 3, Marshall et al. do not show the well-known projection system as discussed above with respect to claim 2 further comprising three pairs of lenses. However, Nelson teaches adding to a projection system a pair of anamorphic lenses, the pair including an expanding lens (element 206) and a collimating lens (lens 104) for optimizing optical efficiency, and being positioned between a light source (light source 11) and a reflective imaging device (DMD 40) (Col. 2, lines 37-43). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add to the well-known image projection system as shown by Marshall a pair of anamorphic lenses for each respective light source and SLM as disclosed by Nelson for optimizing optical efficiency.

With regard to claim 7, see discussion above with respect to claim 3.

With regard to the method claim 23, the structure of the combined invention as discussed above with respect to claims 3 and 7 renders the step set forth in the method claim inherent to the operation of the invention.

5. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall as applied to claim 2 above, and further in view of U.S. Patent No. 6,224,216 to Parker et al. (provided by applicant).

With regard to claims 4 and 5, Marshall does not show the light sources 405, 410, 415 as discussed above with respect to claim 2 to include light-emitting diodes or lasers. However, Parker et al. disclose an image projection system that employs LEDs or diode lasers for emitting the desired wavelengths of the primary colors, thereby eliminating the need for beam splitters (see Col. 2, lines 35-40). Further, Parker et al.

teach that it is well known in the art that LEDs offer a longer life and better primary colors (see Col. 2, lines 41-6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide as the light sources of the well-known projection system shown by Marshall LEDs or lasers as disclosed by Parker et al. for reducing the production of parts for the projection system and enhancing display performance.

6. Claims 8, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall as applied to claim 1 above, and further in view of U.S. Patent No. 6,419,365 to Potekev et al.

With regard to claim 8, Marshall does not teach each of the SLMs 735, 740, 745 as discussed above with respect to claim 1 to be a micromirror display. Instead, Marshall teaches each of the SLMs 735, 740, 745 to be an LCD-based light valve. However, Potekev et al. teach that it is well known in the art to substitute a digital micromirror display for an LCD-based light valve, thereby teaching a micromirror display and an LCD-based light valve to be art-recognized equivalents with respect to function (see Col. 1, lines 29-32). Potekev et al. disclose specifically a micromirror display (DMD 50) comprising an array of digitally deflected mirrors (micromirrors) that are each quadrilateral and pivotable about a diagonal axis (see Col. 5, lines 17-19). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to replace each of the SLMs of Marshall with the DMD of Potekev et al. for providing an alternative means for modulating light.

With regard to claim 13, Marshall teaches the SLMs 740, 735, 745 as discussed above with respect to claim 1 to include reflective pixels adapted to selectively reflect the blue, green and red light towards the projection lens 690 (see discussion above with respect to claim 13).

With further regard to claim 13, Potekev et al. show a conventional reflective imaging device (DMD 50) analogous to the SLM of Marshall (see Col. 1, lines 29-32). Potekev et al. teach the DMD 50 to include reflective pixels adapted to selectively reflect the blue, green and red light towards one of a projection lens (projection lens 52) or a light-absorbing surface (light-absorbing surface 66) in proximity to the lens 52 (see Col. 2, lines 29-33). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute for each of the SLMs of Marshall the DMD of Potekev et al. for providing an alternative means for modulating light.

With regard to claim 14, Potekev et al. teach the light-absorbing surface 66 to be positioned on a frame (optical frame 54) around the projection lens 52 (see Fig. 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the projection lens of Marshall with the projection lens having a frame of Potekev et al. for enhancing display performance.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall as applied to claim 1 above, and further in view of U.S. Patent No. 6,419,365 to Potekev et al. and U.S. Patent No. 6,179,424 to Sawamura.

With regard to claim 9, Marshall does not teach each of the SLMs 735, 740, 745 as discussed above with respect to claim 1 to be a micromirror display. Instead,



Marshall teaches each of the SLMs 735, 740, 745 to be an LCD-based light valve.

However, Potekev et al. teach that it is well known in the art to substitute a digital micromirror display for an LCD-based light valve, thereby teaching a micromirror display and an LCD-based light valve to be art-recognized equivalents with respect to function (see Col. 1, lines 29-32). Sawamura discloses specifically a micromirror display comprising an array of digitally deflected mirrors (mirror elements) that are each quadrilateral and pivotable about a longitudinally centered axis (see Col. 1, lines 27-36). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to replace each of the SLMs of Marshall with the DMD of Sawamura for providing an alternative means for modulating light as taught by Potekev et al.

8. Claims 10 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall as applied to claim 1 above, and further in view of U.S. Patent No. 6,076,931 to Bone et al. (provided by applicant).

With regard to claim 10, Marshall does not teach the light source apparatus as discussed above with respect to claim 1 to be positioned such that the SLMs 740, 735, 745 respectively receive blue, green and red light at an oblique angle of incidence. However, Bone et al. teach the employment of an off-axis projection system, wherein the light incident on a reflective imaging device impinges the device at a non-perpendicular angle, to eliminate the need for a polarizing beam splitter (see Col. 1, line 62 to Col. 2, lines 19). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to position the SLMs of Marshall such

that the SLMs receive light incident thereon at an oblique angle as taught by Bone et al. for reducing the cost of production of the projection system.

With regard to method claim 22, the structure of the combined invention as discussed above with respect to claim 10 renders the step set forth in the method claim inherent to the operation of the invention.

9. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall as applied to claim 1 above.

With regard to claim 11, Marshall does not teach the SLMs 735, 740, 745 and the projection lens 690 as discussed above with respect to claim 1 to be positioned in a first plane and the light source apparatus to deliver light from a second plane. However, it would have been an obvious matter of design choice for one having ordinary skill in the art at the time the invention was made to position the SLMs of Marshall in one plane such that the light source apparatus delivers light from another plane for improving the compactness of the projection system. Further, applicant has not disclosed that the specific placement of the SLMs with respect to the light delivered from the light source apparatus solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the SLMs positioned anywhere with respect to the light delivered from the light source apparatus.

With regard to claim 12, Marshall does not teach the light source apparatus as discussed above with respect to claim 1 to be positioned below the separation/recombination device 615. However, it would have been an obvious matter of design choice for one having ordinary skill in the art at the time the invention was

made to position the light source apparatus of Marshall below the separation/recombination device for improving the compactness of the projection system. Further, applicant has not disclosed that the specific placement of the light source apparatus with respect to the separation/recombination device solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the light source apparatus positioned anywhere with respect to the separation/recombination device.

10. Claims 15-17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall as applied to claim 1 above, and further in view of U.S. Patent No. 5,658,060 to Dove.

With regard to claims 15 and 17, Marshall does not show the dichroic prism 450 as discussed above with respect to claim 1 to include an X-cube. Instead, Marshall shows the dichroic prism 450 to include a three-prism assembly (see Fig. 4). However, Dove discloses an image projection system comprising a projection lens (projection lens 60), a dichroic cross-combiner (dichroic cube 64), three reflective imaging devices (light valves 40, 42, 44) and a light source apparatus (light source 23), thereby rendering the projection system of Dove analogous to the well-known projection system as shown by Marshall (see Col. 2, lines 64-7, Col. 3, lines 27-9, Figs. 2, 5). Dove teaches the dichroic cube 64 to be an X-cube (see Fig. 5). Further, Dove teaches that a dichroic cube may be substituted for a three-prism assembly, thereby teaching a dichroic cube and a three-prism assembly to be art-recognized equivalents with respect to function (see Co. 3, lines 15-8). Dove also teaches the employment of two X-cubes in place of

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one X-cube for recombining beams of light. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the three-prism assembly of the well-known image projection system as shown by Marshall with the dichroic cube of Dove for providing an alternative means for recombining beams of light.

With regard to claim 16, Marshall does not show the sides of the dichroic prism 450 as discussed above with respect to claim 1 to be rectangular. However, Dove discloses an image projection system comprising a projection lens (projection lens 60), a dichroic cross-combiner (dichroic cube 64), three reflective imaging devices (light valves 40, 42, 44) and a light source apparatus (light source 23), thereby rendering the projection system of Dove analogous to the well-known projection system as shown by Marshall (see Col. 2, lines 64-7, Col. 3, lines 27-9, Figs. 2, 5). Dove teaches the sides of the dichroic cube 64 to be rectangular (see Fig. 5). Further, Dove teaches that a dichroic cube may be substituted for a three-prism assembly, thereby teaching a dichroic cube and a three-prism assembly to be art-recognized equivalents with respect to function (see Co. 3, lines 15-8). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the three-prism assembly of the well-known image projection system as shown by Marshall with the dichroic cube of Dove for providing an alternative means for recombining rays of light.

With regard to claim 19, Marshall does not show the image projection system as discussed above with respect to claim 1 to further comprise three field lenses.

However, Dove discloses an image projection system comprising a projection lens

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(projection lens 60), a dichroic cross-combiner (dichroic cube 64), three reflective imaging devices (light valves 40, 42, 44) and a light source apparatus (light source 23), thereby rendering the projection system of Dove analogous to the well-known projection system as shown by Marshall (see Col. 2, lines 64-7, Col. 3, lines 27-9, Figs. 2, 5).

Dove teaches the projection system to further comprise three field lenses (correcting lenses 72, 74, 76) for maximizing display performance (see Col. 3, lines 35-43).

Further, Dove teaches each of the correcting lenses to be positioned between a respective one of the light valves and a respective one of the sides of the dichroic cube 64 (see Fig. 5). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the well-known image projection system as shown by Marshall such that the projection system includes field lenses as disclosed by Dove for maximizing display performance.

11. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall as applied to claim 1 above, and further in view of U.S. Patent No. 5,760,875 to Daijogo et al.

With regard to claim 20, Marshall does not specify the width of the narrow bands of blue, green and red light. However, Daijogo et al. teaches a narrow band of green light having full-width half-maximum spectra of less than about 40 nanometers to render a satisfactory hue of the color green (see Col. 18, lines 2-6). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the projection system of Marshall such that the respective widths of the narrow bands of color render satisfactory hues of blue, green and red.

**Conclusion**

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are provided to further show the state of the art with respect to generating narrow bands of red, blue and green light:

U.S. Patent No. 5,826,959 to Atsuchi


U.S. Patent No. 5,875,008 to Takahara et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Nguyen whose telephone number is 703-305-2771. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russ Adams can be reached on 703-308-2847. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4900.

mpn  
November 1, 2002

  
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